Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supporting Information (ESI)

Recovery of scandium(III) from diluted aqueous solutions by a supported ionic liquid phase (SILP)

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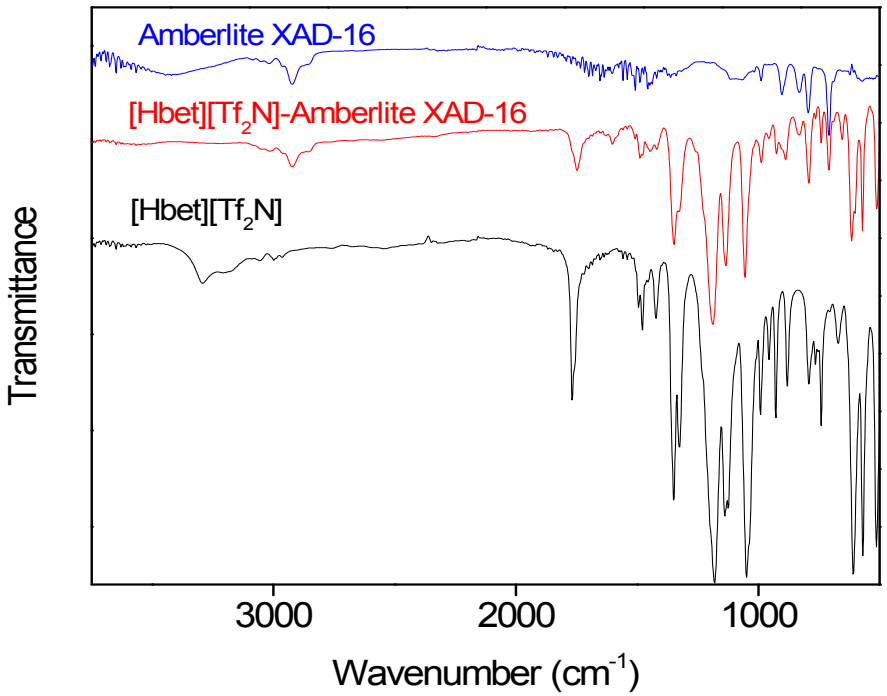

Figure S1 FT-IR spectra of [Hbet][Tf_2N] and SILP prepared by dry impregnation method with [Hbet][Tf_2N] and the Amberlite XAD-16 support.

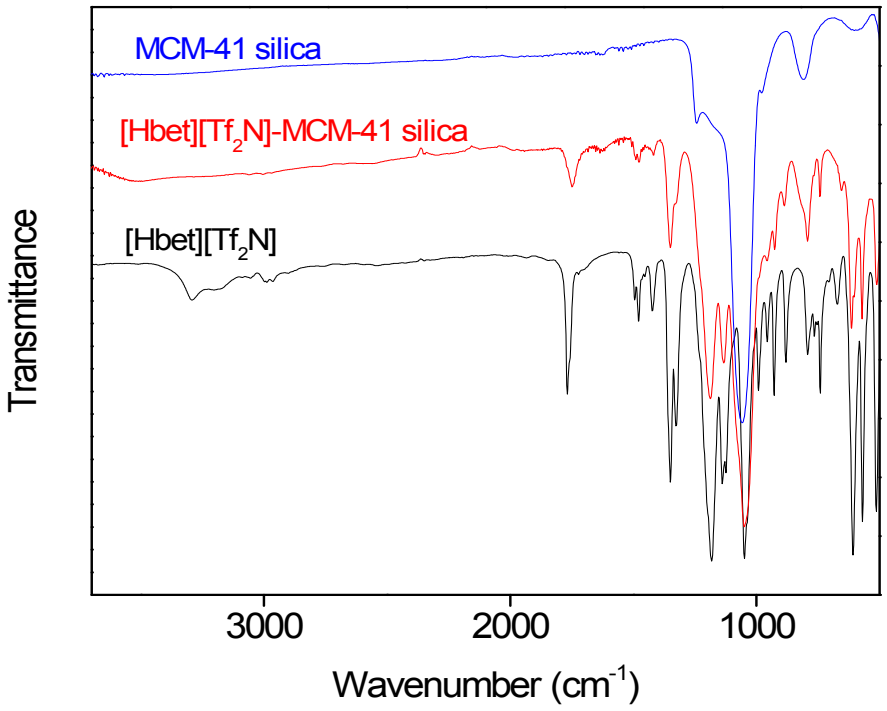

Figure S2 FT-IR of [Hbet][Tf_2N] and SILP prepared by dry impregnation method with [Hbet][Tf_2N] and MCM-41 silica support.

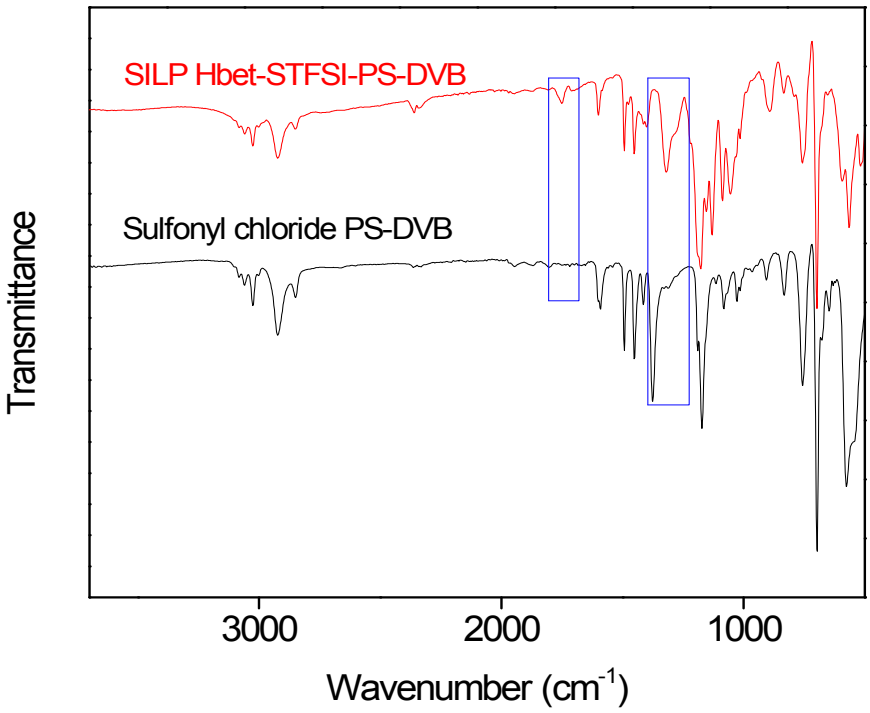

Figure S3 FT-IR spectra of the SILP Hbet-STFSI-PS-DVB and sulfonyl chloride resin. The most characteristic peaks are emphasized by blue rectangles.

Table S1 Characteristic wavenumbers for the transitions in the FT-IR specta of the sulfonyl chloride resin and the SILP Hbet-STFSI-PS-DVB

Vibrational modes	**Wavenumber (cm^{-1})**	
	Resin	**SILP**
w, C-H aromatic stretching	3026	3026
s, C-H asymmetric stretching	2923	2923
s, C=O asymmetric stretching	-	1750
s, C-C aromatic stretching	1592, 1492, 1451	1600, 1493, 1451
s, S=O asymmetric stretching	1414, 1375	1400, 1319
s, S=O symmetric stretching	1173	1177, 1154, 1130
m, C-H aromatic bending	1082, 1028	1087
s, S-N-S stretching	-	1054
C-H bending out-of-plane	906, 833, 757, 697	892, 834, 758, 697
s, C-S stretching	576	564
s, C-F bending	-	517

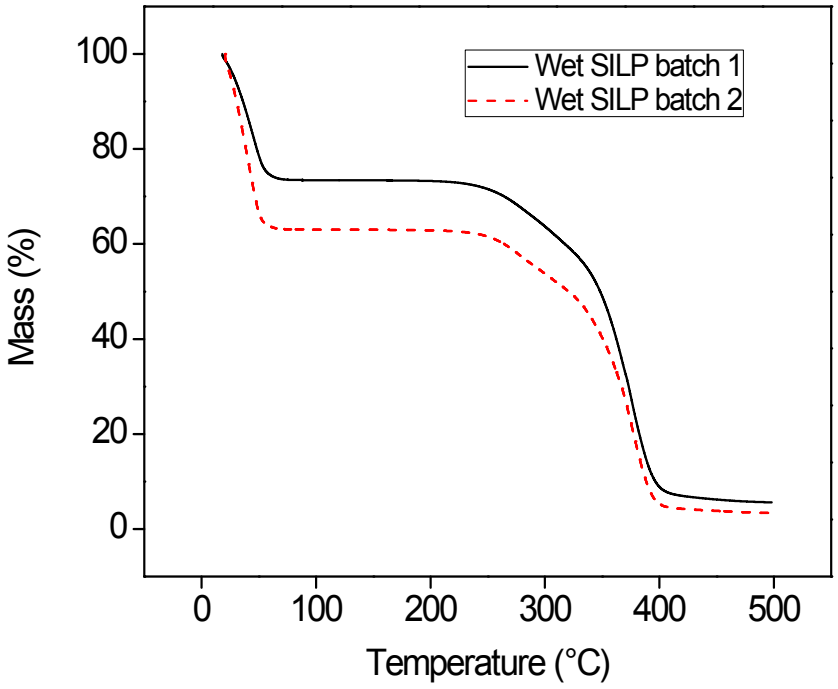

Figure S4 TGA of the wet SILP Hbet-STFSI-PS-DVB in two different batches. Nitrogen atmosphere, heating rate: 5 °C·min^{-1}, from 20 to 500 °C.

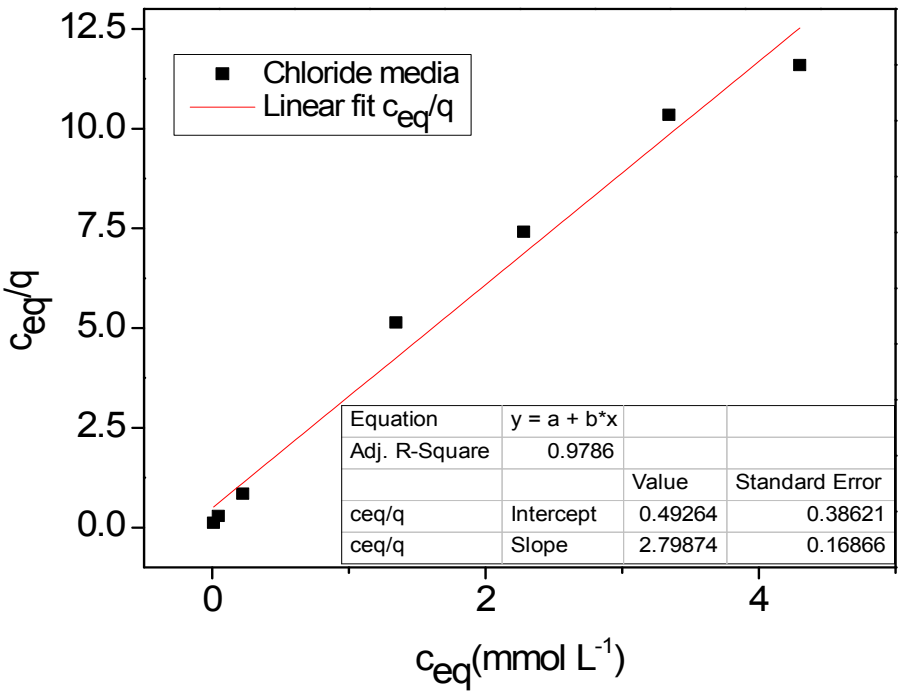

Figure S5 Langmuir adsorption isotherm for uptake of Sc(III) from chloride media at room temperature.

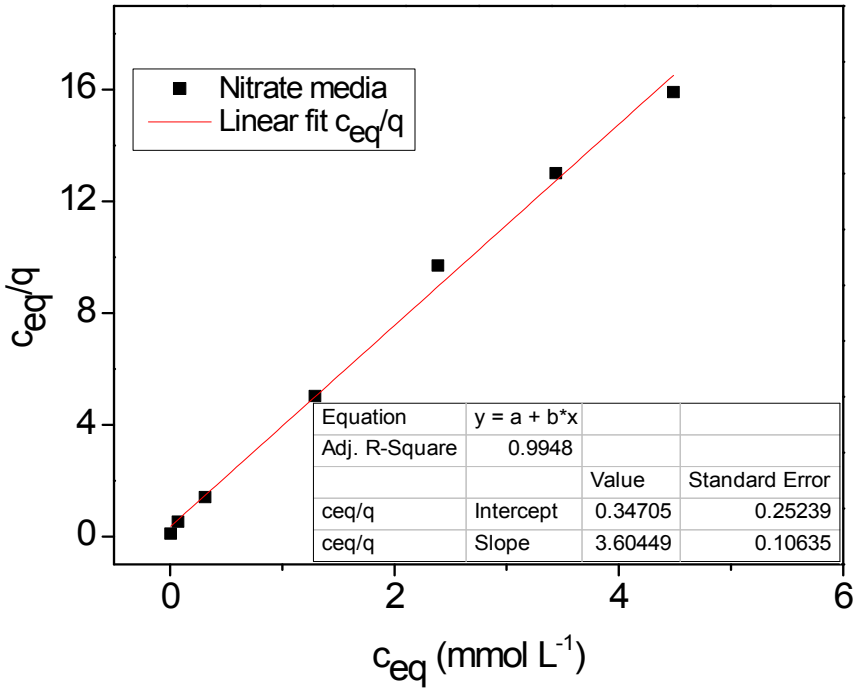

Figure S6 Langmuir adsorption isotherm for uptake of Sc(III) from nitrate media at room temperature.

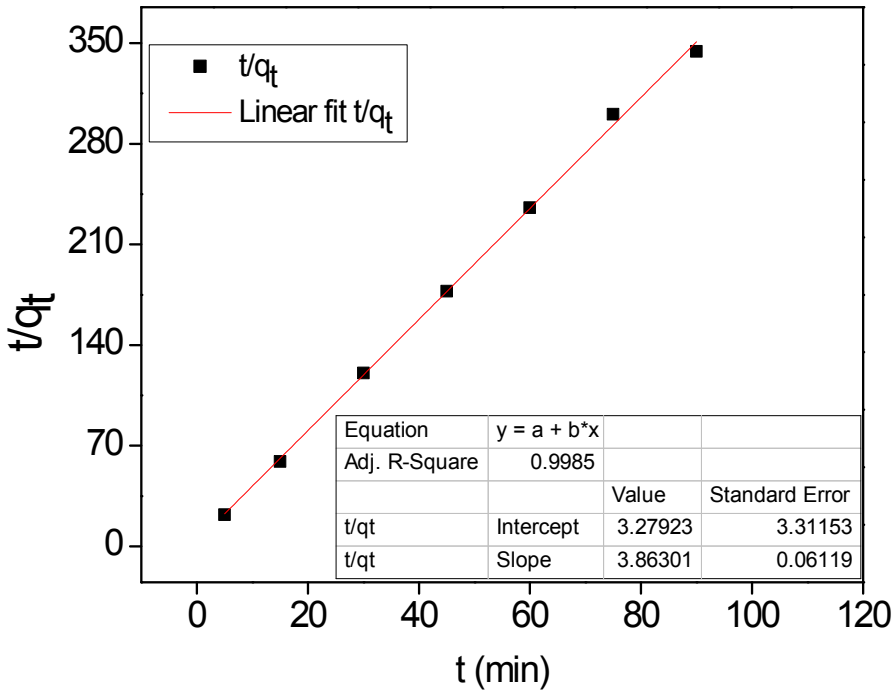

Figure S7 Pseudo-second-order adsorption kinetics of Sc(III) with SILP Hbet-STFSI-PS-DVB: aqueous phase = 10 mL, 0.05 g of SILP, Sc(III) concentration 1.1 mmol·L^{-1}, pH_{in} = 3.0, pH_{eq}=2.5, 300 rpm, room temperature.

Table S2 Wilcoxon's statistical test for comparison between *q* value in each cycle and the mean *q* value.[1]

Cycle	q (mmol g^{-1})	Deviations from the mean value (0.18 mmol g^{-1})·10^{-2}	Deviations in ascending order of absolute values, keeping the signs
1	0.18	0.2	0
2	0.17	0.5	1
3	0.20	1.0	2
4	0.18	-1.4	-3
5	0.15	1.5	4
6	0.19	1.7	5
7	0.19	-3.4	-6
SUM(-)	9	W = min[SUM(-), SUM(+)] = 9	
SUM(+)	12		

For Wilcoxon's two tailed test the critical value of W at p = 0.05 and N = 7 is 2.[2]

9 > 2, W>W(0.05, 7), H_0 is accepted, there is no significant difference between experimental values and the mean value of the data set.

References

[1] P. Coletti, *Advanced statistics* [Internet], **2010**, [cited 2017 March 10].

Available from: http://www.paolocoletti.it/books/AdvancedStatistics.pdf

[2] F. Sani, J. Todman, *Experimental Design and Statistics for Psychology: A First Course*, Wiley-Blackwell, **2005**.